CAPABILITY MATURITY MODEL AND MALCOLM BALDRIGE PERFORMANCE CRITERIA SUCCESSFUL MODELS FOR PERFORMANCE EXCELLENCE

Both the Capability Maturity Model (CMM) and the Malcolm Baldrige Criteria have been recognized as successful models of performance excellence. Companies that have arrived at the highest levels of the CMM or Baldrige are often honored as being 'world class' organizations. I am a strong proponent of the Malcolm Baldrige Criteria because provides a more 'holistic' organizational approach. Baldrige incorporates key aspects such as: leadership, strategic planning, data and information, employee wellbeing, customer satisfaction, process management and results. CMM is primarily process and information and data oriented which essentially focus on only two of the seven Malcolm Baldrige Criteria components. I am prejudice against any model that tries to make improvements without considering the leadership, strategic planning and customer satisfaction in the equation. The following is an exploration some of the key aspects of both models.

An organization should implement process improvements with the primary goal of improving its effectiveness, whether it is to improve cost, schedule, quality, and performance or to support its marketing business. A heavy emphasis is now placed on achievement of a specific SEI CMM level, because of the visibility from the DoD. The DoD has adopted the SEI CMM to assess its process improvement activities and has indicated the importance of using assessed capability as a factor in future contract awards. However, it is easy to lose sight of the real goals of process improvement and be distracted by the race to obtain a particular SEI level in a certain timeframe. The

improvement activities had been originally instituted because it was the right thing for the organization.

Software quality management is based on over 20 years of successful software development and software management experience using practical, not just theoretical methods to evolve development organizations. It is designed to build a common understanding of the current development processes (or lack thereof), give the organization training in how to identify impediments to Key Process Areas and assist teams in developing changes to the process based on their knowledge of the problems and measuring the effectiveness of the changes. An effective organization has predictable schedules, cost and quality. It not only builds products right, they build the right products!

As the 21st century begins, industry and government executives face more complex and intensified management and marketing challenges. Demands to reach higher performance levels and demonstrate organizational results are major priorities. Technology improvements require constant flexibility and continuous learning. Customers, business partners and stakeholders have higher expectations of products and services. Also, a skilled and highly motivated work force is critical to "do the right things" and "do things right." Using the Malcolm Baldrige Performance Excellence Criteria as a framework organizations focus on assessing and improving performance based on the critical factors driving their business success. The Baldrige assessment helps identify strengths and prioritize improvement opportunities on key processes. By using the criteria,

organizations report they improve communications, make effective resource decisions, and

motivate the workforce by aligning individual and organizational performance. The

Baldrige Criteria is results focused because an organization's performance system needs to

focus on key results. Results should be guided and balanced by the interests of all

stakeholders – customers, employees, suppliers and partners. To meet the sometimes

conflicting and changing aims that balance implies, organization strategy needs to

explicitly address all stakeholder requirements to ensure that actions and plans meet the

differing needs and avoid adverse impact on any stakeholders. The use of a balanced

composite of performance measures offers an effective means to communicate

requirements, to monitor actual performance, and to marshal support for improving

results. Senior leadership has the basic responsibility of balancing the necessity of being

entrepreneurial with direct missions and functions. Baldrige focuses on business results in

five key areas: customer focused results, financial performance results, human resource

results, supplier and partner results and organizational effectiveness results. Like the SEI

CMM, the Baldrige Criteria is non-prescriptive. It does not prescribe specific approaches,

measures, tools technologies or systems for performance improvement nor emphasize

factors to be evaluated. The criteria is adaptable though results-oriented. It giving the

organization the latitude to decide how to best meet the requirements depending upon

many factors such as organization type, size, strategy, and stage of development. Federal

organizations view the Criteria as a proven framework to guide their customer-focused

performance efforts. The role of senior leadership is emphasized in setting direction and

guiding the organization. An effective leader promotes continuous learning, not only to

improve overall performance, but also to involve all employees in the ongoing challenge to

enhance customer value. To be successful, leadership must ensure that the organization captures and shares lessons learned. Communication by leadership is critical to organizational success. Communications need to include performance objectives and measures that help provide focus as well as alignment of work units and work processes.

Using the Baldrige Criteria process management is the focal point for all key work processes. Build into the category are the central requirements of efficient and effective process management – effective design, prevention orientation, linkage to suppliers and partners, operational performance, cycle time, and evaluation and continuous improvement. Flexibility, cost reduction, and cycle time reduction are increasingly important in all aspects of process management and organizational design. Depending on the nature of the organization's mission, strategy and markets, flexibility might mean rapid changeover from one product/service to another, rapid response to changing societal needs or customer demands, or the ability to produce a wide range of customized services while maintaining predictable processes and results. To achieve high performance, organizations need to emphasize design quality (process management). Design quality (process management) includes the creation of robust or failure-resistant processes and products. Cost of preventing problems at the design stage usually are much lower than costs of correcting problems that occur 'downstream.' This approach yields the maximum cost benefits and takes the greatest advantage of improvements and corrections. Increasingly process management includes the ability to incorporate information gathered from diverse sources and databases that combine factors such as customer preference, alternative offerings, societal changes, and external research findings and development.

In many companies the Capability Maturity Model plays a major role in defining software process improvement. But does the CMM provide real benefits? Organizations contemplating software process improvement seek assurances that tangible benefits will result from such activities. What data is available across the industry shows that CMM-based process improvement is making a difference in those organizations committed to improvement. Tinker Air Force Base computed a 5 to 1 return on investment for its process improvement initiatives, which generated savings of $3.8 million from a $0.64 million investment. Motorola has long been a champion of CMM as well as Baldrige. Motorola's Government Electronics Division employs about 1,500 engineers to design and build a wide variety of Government Electronics Systems. Approximately 350 GED engineers participate directly in software development. The organization was assessed at SEI level 5. GED uses quality, cycle time and productivity to evaluate development programs because their customers value these attributes. At Motorola GED, each project performs a quarterly SEI self-assessment. The project evaluates each key process area activity as a score between 1 and 10, which is then rolled into an average score for each key process area. Any key process area average score that falls below 7 is considered a weakness. GED states, "Productivity is directly related to our ability to win new programs from our traditional US Department of Defense customer and drives our profitability in emerging commercial products."

Project results from Motorola GED and others show that each level of the CMM improves quality by a factor of about 2. The improvement in quality is expected for

projects that transition from level 2 to 3 due to the Peer Review key process area found in level 3. Peer reviews have been widely recognized in the industry for being the single most important factor in detecting and preventing defects in software products. Quality is also expected to improve for projects transitioning from level 3 to 4 due to Quantitative Process Management and Software Quality Management KPAs. Motorola attributes the improvement from level 4 to level 5 to the Defect Prevention and Process Change Management KPAs. However, Motorola also acknowledges that "..You can more readily achieve large improvements in defect density when the number of defects is large, as would be expected in lower-maturity-level projects. At higher maturity levels, it becomes increasingly difficult to dramatically reduce the defect density." It is important to recognize that projects often experience a decrease in productivity when moving from level 2 to level 3. This appears to be a side effect of asking project staff to do too many things all at once at level 3. When instituting a level 3 system, new processes are rolled out that greatly affects the way individual project members perform their task. At levels 4 and 5, however, each project quantitatively measures its own performance while maintaining productivity. Simply measuring performance does not ensure that productivity will be maintained. It is important when analyzing and selecting any new process improvement to do so with the overall goal of at least maintaining productivity if not increasing it. Monitoring the actual productivity impact of process improvement is also important so real-time adjustments to the process improvement can be made.

When Motorola GED was assessed at level 2 of the CMM in 1989 they were responding to meet their government contract requirement. While each project performed certain

level 2 activities as required, there was no real organizational focus on software engineering processes. GED's chief software engineer perceived a need and started focusing on process improvement while at level 2. At this time a software functional team was created to attempt to unify software engineers from various parts of the organization into a cohesive team. Peer reviews were also introduced. These activities led to a level 3 assessment for Motorola GED in 1992. Starting in 1992 and continuing through 1994, the engineering organization created a process improvement working group. This group had hands-on leadership from the engineering department manager, which proved critical to its success. Throughout GED's activities, senior management sponsorship proved critical to the success of the process improvement efforts. This meant not only taking an active interest in the progress of various process improvement initiatives, but also providing funding and time to do the work and rewarding those who contribute. Motorola's and other level 5 organization's lessons learned are:

- Focus on improving new projects. It is extremely difficult to change projects, especially at a low maturity level, once they have started.

- Adopt a top-down focus before immersing yourself in CMM details; start by assessing the intent of each KPA so that you can determine how it fits into your environment.

- Emphasize productivity, quality, and cycle time. Avoid process for its own sake.

- Management commitment is needed from all levels; commitment from upper management won't be enough unless individual project leaders and managers are also determined to succeed.

- Practitioners and task leaders, not outside process experts, should be used to define processes.

- Managers must be convinced of process improvement's value; it's not free, but in the long run it more than pays for itself.

- The customer must be kept informed about the process, especially as process changes occur.

- Copying process documents from other organizations usually does not work well; the process must match your organization.

- Overcoming resistance to change is probably the most difficult hurdle to overcome.

CMM does play a viable role in the software environment. SEI has also developed CMMs for software, people, and software acquisition, and assisted in the development of CMMs for Systems Engineering and Integrated Product Development. I recognize the absolute necessity of developing CMM for software, people, and software acquisition. However, from a standpoint of organizational effectiveness I would prefer to work hard and build a strong organization using the Malcolm Baldrige rather than tracking separate criteria with all of them being only loosely tied to leadership and strategic planning.

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